4-4 The student will demonstrate an understanding of weather patterns and phenomena. (Earth Science)

Key Concepts:
Water cycle: evaporation, condensation, precipitation, runoff;
Clouds: cumulus, cirrus, stratus;
Weather conditions: wind speed, wind direction, precipitation, temperature;
Severe weather / Storms: thunderstorms, hurricanes, tornadoes;
Weather tools: wind speed-anemometer, wind direction-wind vane/wind sock, air temperature-thermometer;
Weather predicting

Supporting Content Web Sites

Weather Wiz Kid
http://www.weatherwizkids.com/
Website designed by a meteorologist for kids to use to learn more about the weather. Can supply current weather data, information on all weather topics, plus what is currently happening in the world weather related.
4-4.3, 4-4.4

Interactive Weather Forecast
http://www.weatherclassroom.com/forecast/index.php
Make a custom weather channel weather forecast. Enables you to create a five day forecast. (Note: Teacher must register with weatherclassroom.com to access the site.)
4-4.3, 4-4.6

Observing Clouds
http://vathena.arc.nasa.gov/curric/weather/pricloud/index.html
Great pictures and descriptions of the different kinds of clouds.
4-4.2

Wonders in Weather
http://www.cityofportsmouth.com/school/dondero/msm/weather/index.html
Website dedicated to clouds. Look at the different types of clouds, play cloud games and look at additional cloud links.
4-4.2

National Severe Storms Laboratory Weather Room
http://www.nssl.noaa.gov/edu/
Provides general information for students, teachers, and parents. Severe weather, weather maps, weather symbols, careers are all covered at this site.
4-4.3, 4-4.4, 4-4.6

NOAA National Weather Service
http://www.weather.gov/
The website for the National Weather Service. Provides information on warnings, weather observations, forecasts, plus a current weather map.
4-4.3, 4-4.4, 4-4.5, 4-4.6

U.S. Severe Weather Map
http://www.wunderground.com/severe.asp
Up to date severe weather map. Can also link to all other current weather conditions.
4-4.4

Make a Weather Station
http://www.miamisci.org/hurricane/weatherstation.html
Explore weather related resources used in collecting weather data. Simple methods for creating your own weather tools are given.
4-4.5

Interactive Water Cycle
http://www.epa.gov/safewater/kids/flash/flash_watercycle.html
Animated activity that lets you control the water cycle as you learn about it.
4-4.1

Water Cycle
http://www.picadome.fcps.net/lab/currl/water_cycle/
Informational sites and activities all related to the water cycle.
4-4.1

Suggested Literature

Bundey, N. (2001). *Storms and the Earth: The Science of Weather Series.* Minnesota: Lerner Publications Co.
ISBN: 1-57505-474-4
Storms and Earth uses current events to spark interest in students. Includes a general introduction to weather instruments used in collecting data.
4-4.4, 4-4.5

Galiano, D. (2000). *Clouds, Rain, and Snow.* New York: The Rosen Publishing Group.
ISBN: 0-8239-3092-0
This book discusses cloud dynamics and how rain and snow develop. Topics include the processes of evaporation and condensation as well as the types of clouds.
4-4.1, 4-4.2

Gibbons, G. (1993). *Weather Forecasting.* New York: Simon& Schuster Children's Publishing.
ISBN: 0689716834
Lexile Level: 540L
Describes forecasters at work in a weather station. Shows how they use tools and technology.
4-4.5

Kahl, J. (1996). *Weather Watch: Forecasting the Weather.* Minnesota: Lerner.
ISBN: 0822525291
This book was written by a meteorologist and provides methods for observing, analyzing, and forecasting the weather. Includes directions for building a weather station.
4-4.5, 4-4.6

Olien, R. (2005). *First Facts Water All Around: Weather and the Weather.* Minnesota: Capstone Press.
ISBN: 0736737027
Water and Weather includes information about the changing weather, the water cycle, how air causes weather, basic cloud types, and precipitation.
4-4.1, 4-4.2, 4-4.3, 4-4.4

Sievert, T. (2005a). *Weather Update: Precipitation.* Minnesota: Capstone Press
ISBN: 073683737X
Precipitation takes an indepth look at water that falls from the sky. Text explains how rain, snow, sleet, and hail form and also explains how to measure the amount that has fallen.
4-4.1, 4-4.3, 4-4.5, 4-4.6

Sievert, T. (2005b). *Weather Update: Storms.* Minnesota: Capstone Press
ISBN: 0736837388
Storm explains all sorts of violent weather from lightning and thunder through monsoons.
4-4.4

Sievert, T. (2005). *Weather Update: Weather Forecasting.* Minnesota: Capstone Press
ISBN: 0736837396
Weather Forecasting shares the work of meteorologists. This book helps students comprehend how tools and technology can help determine how weather systems develop.
4-4.5, 4-4.6

Staub, F. (2003). *Kids' Book of Clouds and Sky.* New York: Ssterling Publishing Co., Inc.
ISBN: 0806978791
This book provides answers to many questions such as "What are clouds?" Provides answers with text as well as pictures. Contains 47 frequently asked student questions along with answers.
4-4.2

Wick, W. (1997). *A Drop of Water: A Book of Science and Wonder.* New York: Scholastic Press.
ISBN: 0590221973
Lexile Level: 870L
Text explains the concepts of evaporation, condensation, capillary attraction, and surface tension.
4-4.1

Suggested Streamline Video Resources

Weather Changes and Measurement
Water (see also Temperature, Wind)
ETV Streamline SC
Take a close up look at the water cycle and how it affects earth. Some discussion of clouds is included.
4:25
4-4.1, 4-4.2

Clouds, Weather, and Life
ETV Streamline SC
This delightful program introduces children to the basic cloud types. In accordance with the National Science Education Standards and the American Association for the Advancement of Science Benchmarks for Science Literacy, five important scientific concepts of weather are reviewed. These include the hydrologic, or water cycle, that life is dependent upon this cycle, the sun is the causative agent that powers the formation of clouds and the water cycle, the three state of water, and weather is changeable in time and place.
00:00-12:05
4-4.1, 4-4.2

Investigating Weather
Thunderstorms, Tornadoes, Hurricanes, Typhoons, and Cyclones
ETV Streamline SC
This program explains the basics of weather. Footage includes violent storms, tornadoes, and hurricanes. Safety issues are also discussed.
02:49
4-4.4

Hurricanes, Tornadoes, and Thunderstorms
ETV Streamline SC
Each year, hundreds of hurricanes and tornadoes cause massive destruction and loss of life throughout the world. While tornadoes pack the highest wind speeds on earth (over 200 m.p.h.), hurricanes are more devastating because of their wider paths of destruction. What causes these killer storms? How are they similar? How are they different? These

and other questions are discussed in this exciting program which is filled with awe-inspiring "eye-witness" video and impressive 2D and 3D animation. After watching this video, students will have a better understanding of the forces behind these and other types of storms. (Note: Select appropriate sections)
24:00
4-4.4

Rain or Shine: Understanding the Weather
Meteorologists and Weather Forecasting
ETV Streamline SC
We see in great detail how weather predictions are made possible.
02:12
4-4.3, 4-3.5, 4-4.6

Eye Wonder: Weather
ETV Streamline SC
In Eye Wonder: Weather, the science of predicting the weather is explored. Students see how current conditions are taken and how those conditions can affect the future conditions. The function of Doppler radar in weather prediction is discussed. Students can suggest topics for future programs by e-mailing eyewonder@scetv.org. The program's new Web site contains teacher guides with standards in addition to creative student activities: www.eye-wonder.org.
05:43
4-4.3, 4-4.5, 4-4.6

Severe Weather Safety: Watch for the Warning
ETV Streamline SC
This program teaches safety procedures for lightning, flash floods, tornadoes, and other high winds. Alan Sealls, a meteorologist, gives solid tips and information to help school personnel and students develop a proactive safety plan both at school and at home. Interviews are included from emergency management experts. Protect yourself and those around you from violent warm-weather hazards by learning what they are and how to get warning information about them. The focus of this program is teaching viewers to plan ahead and avoid ending up in a life-or-death situation-being proactive rather than reactive. Through exciting live-action video, students and teachers will learn the definitions of sever weather watches and warnings and how to identify potentially dangerous sever weather situations.
18:07
4-4.4

Weather Smart: Forecasting and Weather Instruments
Thermometers: Measuring Temperature
ETV Streamline SC
Examine the tools and instruments used by meteorologists to measure temperature – thermometers. Students become familiar with the name and functions of this instrument.
00:32

4-4.5

Weather Smart: Forecasting and Weather Instruments
Anemometers and Wind Vanes: Measuring Wind
ETV Streamline SC
Examine the tools and instruments used by meteorologists to measure wind speed and direction – anemometers and wind vanes. Students become familiar with the names and functions of these instruments.
01:26
4-4.5

Weather Smart: Forecasting and Weather Instruments
Radar and Rain Gauges: Locating and Measuring Precipitation
ETV Streamline SC
Examine the tools and instruments used by meteorologists to measure precipitation – rain gauge. Students become familiar with the name and function of this instrument.
01:26
4-4.5

Career Connections

Atmospheric Scientist
Atmospheric science is the study of the physics and chemistry of gases, clouds, and aerosols that surround the planetary bodies of the solar system. Atmospheric scientist may study the atmosphere of different planets or may focus on Earth's atmosphere. Atmospheric scientists may work in the following areas: field research, laboratory studies and/or computer analysis and modeling. Good communication skills (oral and written) are necessary as they are involved in carrying out research and reporting it out. Most atmospheric scientist in the United States work for the Federal Government and branches of the National Oceanic and Atmospheric Administration or may work for private weather services. (ES-4.4)

Meteorologist
Meteorologist forecast weather. They compare temperature readings, winds, atmospheric pressure, precipitation patterns, and other variable to form an accurate picture of climate. They are able to draw conclusions to make predictions, develop computer models and carry out basic research to help understand how the atmosphere works so they can predict how it behaves. (ES-4.4)

Storm Chasers
Storm chasers are scientists who follow tornadoes to study them. They try to drop weather instruments into the paths of tornadoes to measure the air temperature, air pressure, wind speed, and wind direction inside a tornado. This can be a difficult and dangerous career. Storm chasers rely heavily on meteorologist who predicts the storms and then guide them to the most promising systems. (ES-4.4)

Climatologist
Climatologists study climate change, climate variability, and the effects of climate on the biosphere. They use computers to predict the effect of weather or climate on the growth and development of grain, vegetables, fruit, and other crops. Climatologists work for state and federal governments as weather station network supervisors, computer programmers, and supervisors of climate data publications. (ES-4.4)

Hydrologist
Hydrologists help assess and protect our water supplies and water quality. Hydrologists manage surface and ground water to avoid problems caused by floods, droughts, population growth, and the impact of humans. Hydrologists working on water quality problems deal with the chemical, physical, biological, and radiological properties of water we use for drinking, irrigation, industrial cooling, or swimming. They also help assess how land use affects water quality, and they help develop strategies to reduce the impact of land use and land use change on water quality. (ES-4.4)